WVU/NASA IV&V Technical Library

Independent Verification and Validation
Introductory Reading List
July 2002

Books

Lewis, Robert O. *Independent Verification and Validation: a Life Cycle Engineering Process for Quality Software*. John Wiley & Sons, 1992 QA76.76.V47 L48 1992

This classic text on IV&V work presents a variety of methods intended to ensure better quality, performance, cost and reliability of technical products and systems. It features numerous hints, tips and instructions for better interaction between verification and validation personnel, development engineers and managers.

Rakitin, Steven R. *Software Verification and Validation for Practitioners and Managers*, 2nd ed. Artech House, 2001. QA76.76 .V47 R35 2001

Rakitin's book offers guidance in essential software V&V techniques and helps balance the conflicting demands of quality, features, and schedules. The reader will also learn how to balance the conflicting needs of people, process, and product, and manage commitments and risk. Other key topics include: metrics, configuration management, and software reliability growth modeling.

Schulmeyer, G. Gordon and Garth R. Mackenzie. *Verification and Validation of Modern Software-Intensive Systems.* Prentice-Hall, 2000. QA76.76.V47 S38 2000

This book brings the classic approaches up to date to apply them to contemporary computing methods. Based on the latest standards and research, the authors cover V&V for areas that have not been previously treated collectively, including client/server networks, Internet and intranet applications, object orientation, knowledge-based systems, rapid application development, data warehousing, Graphical User Interface (GUI) development, and usability.

An Assessment of Space Shuttle Flight Software Development Processes. National Academy Press, 1993, pp. 29-38. TL795.5.A87 1993 Available at: http://books.nap.edu/books/030904880X/html/29.html#pagetop

This chapter on IV&V as applied to the space shuttle is a good brief overview of the process. It attempts to establish definitions for key terms and to provide a sense of the advantages and disadvantages offered by different approaches to software assurance.

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Papers

Arthur, James D. and Richard Nance. "Verification and Validation Without Independence: a Recipe for Failure" Spring 2001. Available at: http://courses.cs.vt.edu/~cs5704/spring01/arthur/IVnVRecipe.pdf

The objectives of this paper are four-fold: (1) to examine the current picture in software systems development, (2) to review the rationale, role and expressed need for IV&V, (3) to identify the benefits attendant in the insistence on the "independent" status of the activity, and (4) to respond to the usual criticisms of negative impacts on cost and schedule.

R Boehm, Barry W. "Verifying and Validating Software Requirements and Design Specifications" in *Software Risk Management* by Barry Boehm. QA76.76.D47 B671 1981 and in *IEEE Software*, January 1984, pp. 75-88.

This article presents guideline information on verification and validation of software requirements and design specifications.

Rosenberg, Linda H. "Verification and Validation Implementation at NASA." *Crosstalk* Vol. 14, no. 5 (May 2001), pp. 12-15. Available at http://www.stsc.hill.af.mil/CrossTalk/2001/may/rosenberg.asp

This paper discusses the importance of IV&V and then presents NASA's IV&V implementation approach on all software development throughout the agency.

Internet Resources

NASA IV&V Facility web site FAQ. http://www.ivv.nasa.gov/faq/index.shtml

Edwards, Steven. Lecture notes (slides) for a computer science class. http://mit.iddl.vt.edu/cs5744/coursecontent/notes/IV+V/

Defines basic terms, then presents different types of IV&V efforts and how they are characterized. Lays out the ground rules for effective IV&V. Overviews IV&V activities by lifecycle phase. Presents results of a small experiment showing the effectiveness of IV&V. Presents a more detailed view of IV&V tasks for the requirements phase.

United States Navy. http://www.nps.navy.mil/wings/acq_topics/synopsis/independent_verification.htm

These three slide shows are a part of the Navy's software acquisition topics dating from winter 2000 to winter 2001.

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Further Reading

Books

American Association for Artificial Intelligence. *Verification & Validation of Knowledge-Based Systems: Collected Papers from the 1997 Workshop.* AAAI Press, 1997. QA76.76.V47 V47 1997

Deutsch, Michael S. *Software Verification and Validation: Realistic Project Approaches.* Prentice-Hall, 1982. QA76.76.V45 D48 1982

Lee, Alice. "Quantitative Measures for Software Independent Verification and Validation." NASA, Lyndon B. Johnson Space Center, December 1996. QA76.76.V47 L43 1996

Reports

United States General Accounting Office. "Space Shuttle: NASA Should Implement Independent Oversight of Software Development" February 1991. QA76.76.V47 1991

This is the report that got it all started for the Independent Verification and Validation Facility and led to the creation of the Facility.

Easterbrook, Steve. "The Role of Independent V&V in Upstream Software Development Processes" NASA/WVU Software IV&V Facility, Software Research Laboratory, 1996. QA76.76.V47 E28 1996

Wallace, Delores R. and Roger U. Fujii. "Software Verification and Validation: Its Role in Computer Assurance and Its Relationship with Software Project Management Standards." National Technical Information Service, September 1989. QA76.76.V47 W35 1989; also in *Software Engineering*, pp. 220-234 QA76.758.S6454 1997

This report shows how the software verification and validation methodology and V&V standards provide a strong framework for developing quality software. It describes software V&V, its objectives, recommended tasks, and guidance for selecting techniques to perform V&V. It explains the differences between V&V and quality assurance, development systems engineering, and user organization functions. And, it explains that V&V produces maximum benefits when it is performed independent of development functions.

Standards

IEEE Computer Society. *IEEE Standard for Software Verification and Validation*. IEEE STD 1012-1998

IEEE Computer Society. *Guide to Software Verification and Validation Plans.* IEEE 1059-1993